Research Proposal of the Thesis Entitled

Universal Design for Learning in Design Education

Submitted for the award of the Degree of

Doctor of Philosophy by

Mira Patel

Enrolment No.: 202104009

Under the guidance of **Dr. Arunachalam Muthiah**

In the

United World School of Design

KARNAVATI UNIVERSITY

Karnavati University, Gandhinagar

Topic: Universal Design for Learning in Design Education

Introduction:

In India, design education has advanced over time and is flourishing. The challenge arising in the Design education system is to respond to diverse student populations with a growing recognition that students may come from various socioeconomic, racial, ethnic, cultural, and educational backgrounds (Flood and Banks 2021). The term universal design for learning was adapted from universal design (UD) in the field of architecture, which was declared by Ron Mace at North Carolina State University (Dewi, Dalimunthe, and Faadhil 2018). Architecture's definition of universal design (UD) is a method of creating structures that many people, including those with disabilities, might be able to access. In other words, the goal of UD is to make it easier for people to access their surroundings. Examples of universal design (UD) in architecture include of constructing a ramp or installing a lift for wheelchair users, providing access for the blind by marking a path, or offering directions for the deaf.

There are three educational models: UDL (universal design for learning), UDI (universal design of instructions), and UID (universal instructional design) fall under the umbrella of universal design of education. Each model is based on a set of principles that focuses on reducing obstacles in classroom contexts and improving access to education and curriculum for students from various backgrounds. David H. Rose from the Harvard Graduate School of Education and colleagues from the Centre for Applied Special Technology (CAST) developed the concept of universal design for learning (UDL), which was a framework based on research in the fields of education and neuroscience as well as the growing influence of digital technology for developing curricula, teaching materials, and assessment. UDL is a framework of set principles and guidelines for creating and implementing adaptable teaching and learning strategies that consider students coming from different cultural backgrounds within the classroom context. Universal design for learning provides guidelines to faculty for creating curricula, resources, and learning environments that are more usable and accessible by all culturally diverse students. Three guiding principles of UDL offer numerous options for engagement, representation, action, and expression. These principles are divided into 33 checkpoints and 9 guiding principles.

Literature Review:

The literature was systematically and independently searched through various databases Google scholar, ScienceDirect, Scopus, and Web of Science. The search keyword used were universal design for learning, universal design, design education, teaching and learning process and student diversity. There were 102 studies found in total that matched these search parameters. The following criteria were independently examined for inclusion in each of the 102 studies: In order to promote awareness of or adoption of UDL practises among various postsecondary learning populations, the study that was included as part of a literature review should mention universal design (UD), universal design for learning (UDL), universal design for instruction (UDI), and/or in the title or abstract, identify the participants, and conduct an interview or survey on UDL. Out of 102 research papers, 51 papers were considered for the literature review, based on the intervention or practice conducted on UDL, and the majority of the studies were discarded. The identified studies were analyzed based on the types of outcomes of the study, the location of the study, research methods, and learning methods. The below twenty studies have been documented which focused on how helpful did the educators find the training given on incorporating Universal Design for Learning principles and guidelines in creating their daily lesson plans to overcome barriers for students coming from diverse backgrounds and cultures in higher education, and what do the students think about including UDL in their learning process?

1. The study by (Izzo et al. 2008) conducted two sequential studies to examine faculty members' experiences, perceptions, instructional practices, and training needs with regard to students with disabilities. The analysis of the focus groups revealed common themes, including faculty interest in and need for knowledge of how to satisfy the various needs of today's college students. The strategies that were mentioned were (a) develop a climate that fosters trust and respect, (b) identify the course's essential material, (c) employ a variety of instructional techniques, (d) offer students a number of ways to access the material, (e) incorporate natural learning supports, (f) allow for multiple ways to demonstrate understanding of the course's essential material, and (g) stay up to date on new and promising instructional technologies. The results of (Izzo et al. 2008) emphasize the need for faculty to meet diverse student learning needs with equally diverse methods of instruction, engagement, and assessment. By incorporating flexible teaching and learning techniques more students will have access to course material that are sensitive to students talents and learning preferences, which will contribute to their higher learning outcomes.

2. The study conducted by (Spooner et al. 2007) focused on the effects of training in Universal Design for Learning (UDL) on the lesson plan development of special and general educators in a college classroom environment. This study included a control group and a true experimental group design. The teachers were given a one-hour teacher training program. Where they were introduced to the UDL principle and how it can assist teachers in creating lesson plans that are accessible to all students, after the experiment the results were compared between the pre-test and post-test.
3. The study by (Schelly, Davies, and Spooner 2011) was conducted to measure the effectiveness of UDL instructor training, as indicated by student perceptions of UDL implementation. Participants in the study involved five teachers and the instructors were given training on the UDL principles and guidelines and taught in 9 sections for the course Introduction to Psychology where a total of 1615 pupils were registered across the five sections. The result of the study conducted by (Schelly et al. 2011) indicates that UDL training for instructors appears to change students' perceptions about how their instructors' present ideas and information, engage students, and allow students to comprehend course content. During the training session, the two areas that seemed to have the biggest influence on teachers' behavior were: concentrating on offering course materials in various forms and conveying ideas in various ways. The second was the requirement, to sum up, important ideas before, during, and just after instructions. Following the training sessions, the teachers were able to quickly use these UDL methods in their classroom instruction.
4. The study by (Zhong 2012) explores multiple UDL principles that could be applied to library instruction by providing a lesson plan in general and one focusing on teaching Boolean Logic. Fifty students who were enrolled in California State University, Bakersfield's for their credit-bearing courses English 110 and Writing and Research, participated in the study. Wherein the standard teaching methods and UDL principles were both applied to library instruction and compared. In the end, students were asked to complete a survey that was specifically created to examine the best methods for teaching fundamental information search abilities like Boolean logic. From the results, it was found that students felt applying UDL approaches was much more effective than traditional methods in order to understand the knowledge of Boolean logic.
5. The (Davies, Schelly, and Spooner 2013) study focused on comparing students' perceptions of instructor teaching methods using UDL principles. A control group investigation was conducted with students and teachers. The instructors received training

on UDL principles so they could design assignments for their introduction to psychology course, give students feedback on their work and create detailed rubrics for evaluation. The finding of Davies et al. (2013) study suggests that UDL training has a significant effect on students' perceptions of instruction in university courses as measured by student perceptions on the UDL questionnaire. The strategies that were most significantly impacted by the training, according to the student report, were (a) presenting the material in various formats, (b) connecting key concepts to the course's overall objectives, (c) providing an outline at the beginning of each lecture, (d) summarizing the material throughout each class session, (e) highlighting significant portions of an instructional video, (f) incorporating instructional videos, and (g) using materials that are straightforward to understand.

6. The (Chita-Tegmark et al. 2012) study focused on how learning is influenced by cultural variability and how the Universal design for learning framework might be used to create a curriculum that is responsive to this cultural dimension of learning. To demonstrate several ways the UDL guidelines can be utilized to make a curriculum that may help students, the author chooses one example from each principle. The finding of (Chita-Tegmark et al. 2012) study identified and analysed the three checkpoints from the three principles of UDL, 3.2 Highlight Patterns, Critical Features, Big Ideas, and Relationships, 5.3 Build Fluencies with Graduated Levels of Support for Practice and Performance and 9.2 Facilitate Personal Coping Skills and Strategies. With the help of the examples, the author described how western and eastern preferences often vary from culture to culture. Therefore, the curriculum should be created in a way that can assist students in understanding even from different cultural contexts.
7. The study by (McGhie-Richmond and Sung 2013) focused on introducing Universal Design for Learning Principles and guidelines in a university teacher education program with pre-service and practicing teachers where they formed a framework for developing inclusive lesson plans based on specific learning outcomes (a) recognizing diversity in the classroom, (b) understanding barriers that are experienced by students who have learning differences and needs, and (c) addressing barriers to student participation by applying Universal Design for Learning principles to instructional planning. The study shows that when given the opportunity to teachers help them actively modify their class strategies to make a better learning environment for everyone.
8. The purpose of the study by (Black, Weinberg, and Brodwin 2015) was to assess the views of college students with disabilities on instructional strategies and approaches that were beneficial to their learning, as well as the amount to which such perspectives were aligned

with UDL/UDI. The fifteen students who participated in the data collection process were interviewed for 30 to 45 minutes using a set of questions that supplied both qualitative and quantitative data, some of which had a Likert scale. From the study, it was identified that the students with disabilities faced obstacles to learning. Both students with and without disabilities stated that they performed better academically when they had a choice of learning preferences. The students offered a variety of viewpoints that aided in their education and helped them progress in their higher learning. These measures include setting clear objectives, offering sophisticated organizers, presenting material in a variety of formats, providing frequent insightful feedback, and utilizing a variety of assessment techniques.

9. The literature review study by (Capp 2017) focused on understanding the effectiveness of UDL in improving the learning process for all students. Eighteen research publications that fit the requirements were included in the study. These papers were then separated into subgroups depending on the target audience, the UDL principle implemented, and the research approach used during the study. The results of the study show that, in accordance with the principles and recommendations established by the Centre for Applied Special Technology, all students can access knowledge in a number of ways and display their knowledge and abilities in a variety of ways. The UDL principles, guidelines, and checkpoints developed by CAST were implemented to improve the learning processes of all the students.
10. The study by (Griful-Freixenet et al. 2017) aimed to explore whether UDL addresses the learning needs of students with disabilities effectively. In the study, two male and eight female students who all were from Belgium decided to participate in the research. In the study, the researcher looked at students' perspectives on the course they had taken in college, the teaching techniques and strategies used by the faculty that helped them learn, and the challenges they felt with learning. From the study, it was found that the students found two UDL principles more beneficial i.e., multiple means of representation and multiple means of action and expression. In accordance with these two concepts, the students mostly evidentially used guidelines 3, 5, and 6; nevertheless, we discovered that guidelines 1, 2, and 4 were only applicable to some students. The results addressed that the academic demands of some students could put obstacles in the way of learning for others. In order to remove these drawbacks, one must consider each student's unique learning requirements in addition to making modifications to the curriculum and learning environment.

11. The study by (Almumen 2020) explores the practical implementation of UDL in inclusive learning contexts. This study evaluated the value of implementing UDL principles for all students, including those with disabilities, with various access possibilities to learning environments from the perspectives of their teachers and real classroom applications. In the study, five Kuwaiti teachers took part. The primary data for this investigation were derived from 25 consecutive observations. The outcomes of the study were furthered/supported by instructor interviews. According to the results, UDL is successful in engaging all learners, even those who have challenges. According to the study's findings, implementing UDL in the classroom has helped to lessen the difficulties and obstacles that students with disabilities have when trying to learn. By providing the necessary foundation and adjustments, it was seen that UDL provided flexibility in how information might be accessed.
12. The study conducted by (Carrington et al. 2020) aims to explore if there was evidence of the principles, guidelines, and checkpoints of UDL in educators' descriptions of their practice when supporting students on the autism spectrum. In total twenty educators were identified for the study, which consisted of eight teachers, two school principals, and ten specialists. The researchers employed a mixed methods approach that comprised questionnaires and interviews with various stakeholders. It was feasible to find out more about how educators support kids who are dealing with the syndrome spectrum through semi-structured interviews. The study's findings showed that participants were willing and able to employ adaptable tactics to support students who are autistic by giving them a variety of learning opportunities, ways to symbolize what they are learning, and ways to encourage the expression of their knowledge. Despite the fact that all three of the UDL principles were clearly visible in the educators' descriptions of their practice, it can be inferred from the study that the majority of the approaches reported by the educators were targeted at specific student rather than being used as class-wide approaches.
13. The study conducted by (Flood and Banks 2021) examines the development and evolution of UDL in Irish education policy over the past decade by exploring the use of UDL in national educational curriculum frameworks. This study reveals that UDL components are integrated into curriculum ideas from the elementary to senior cycle that supports partnership, choice, and flexibility as well as engagement, involvement, and relevance. The junior cycle was found to exhibit the potential of UDL in numerous ways.
14. The study by (Lakkala and Kyrö-Ämmälä 2021) aim was to view the teachers' pedagogical practices in implementing the UDL model in the theoretical context of the

multidimensional adapted process (MAP) model of teaching. The study was carried out in Finland as a case study with two co-teachers and an expert teacher who used UDL in their various classrooms. It was divided into two stages, the first of which involved reviewing the teacher's pedagogic practices and how they were designed throughout the teaching process, and the second of which involves examining any shifts that occurred in the students' learning experiences and motivation by comparing the students' perceptions of their own learning before and after UDL lessons applied during the process. The instructors' psychological feature skills, which were divided into three subdimensions: 1) content knowledge, 2) pedagogical knowledge, and 3) pedagogical content knowledge, were the most comprehensive. All three subdimensions were interconnected to the three UDL principles.

15. The study conducted by (AlRawi and AlKahtani 2021) was a literature review analysis that reviewed papers from 2008 to 2018, in which it focused on the educational effects of interventions based on the Universal Design for Learning (UDL) for children with intellectual disabilities. The review intends to evaluate the interventions, research methodology, and effectiveness of these studies. The inclusion criteria used in this study were fulfilled by seven studies. The results of (AlRawi and AlKahtani 2021) concluded that the UDL-based interventions in teaching students with ID included the use of digital environments, e-books, shared stories, audio systems, software, and educational activities. They have been proven to be successful in educating students with ID in terms of intellectual, social, and behavioural aspects.
16. The study by (Xie and Rice 2021) focused on understanding the university instructors' professional and social investments in learning about UDL to guide their teaching. The researcher held three workshops each of 50 minutes. Each workshop had a unique set of objectives and outcomes. The researcher concentrated on identifying various learning requirements and meeting those needs with the UDL framework over the three stages of the workshops. For workshop 1, the researcher addressed subjects related to UDL and accessibility. In workshops 2 and 3, the researcher focused on formative assessment and feedback. analysis of the study's themes, which centred on enhancing collegiality and student participation. Creating accessible curricula, using technology to enhance learning and assessment. Gaining support for difficulties, sharing achievements, and feeling a part of the campus community were sub-themes within enhancing collaborations.
17. The study by (Wang, Sommier, and Vasques 2022) aims to examine whether the development of students' sustainability competencies is dependent on how courses are

delivered at higher education institutions (HEIs). The paper focuses on the three pedagogical approaches (a) Universally broadly applicable pedagogies that have been used in many disciplines, (b) Community and social justice pedagogies developed for addressing social justice and community-building and (c) Environmental education pedagogies evolving from environmental education practices. The findings of (Wang et al. 2022) study reveal that the strength of universal, broadly applicable pedagogies is positively related to the development of students' sustainability mindset/framework as well as their sustainability action/communication.

18. The paper by (Ayuso-del Puerto and Gutiérrez-Esteban 2022) aims to check the E-resources that are collected in the Spanish repositories according to the UDL principle, with the focus of establishing universal digital literacy for all pupils. According to the study, the materials are beneficial to students who are determined and curious in learning. Additionally, it motivates students to try over and over even after making a mistake, encouraging perseverance and hard work. These elements encourage the development of a balanced and good self-concept. From the analysis, it was found that many E-resources did not match the several indicators which were designed for their evaluation. As a result, none of the E-resources have received a high accessibility level classification in accordance with the UDL principles and guidelines.
19. The study by (Unluol Unal, Karal, and Tan 2022) focused on examining the effectiveness of UDL training on general education teacher candidates in preparing daily lesson plan writing skills. The workshop training took place in three stages, the first stage concentrated on writing course objectives based on the student's performance level as described in the case scenario, the second stage concentrated on developing a daily lesson plan by selecting one of the course objectives the have created and the third stage concentrated of designing course materials considering all three principles of the UDL. The finding of (Unluol Unal et al. 2022) study showed that there were significant differences for each UDL principle including representation, action and expression, and engagement. The study results suggest that UDL training when given to teachers proves to be effective in fostering learning environments. In order to address the requirements of all students, teachers should design their daily lesson plans by integrating the UDL principles and guidelines.
20. The study by (Smith 2012) concentrated on three areas: (a) student perceptions of faculty use of UDL in their courses; (b) student involvement connected to the incorporation of these practices; and (c) the connection between the employment of UDL techniques and student engagement. This study's main objective was to observe one faculty member's

educational methods over four semesters. Her preparation was guided from the start of the semester by an emphasis on creating the course using a UDL perspective. She created lesson plans that matched attainable goals with defined objectives. According to the (Smith 2012) study findings, when professors use the UDL framework to plan their course instruction and include UDL strategies and technology in their classrooms, there is a positive correlation between student interest and involvement.

Problem Definition:

From the analysis, it was identified that the majority of the studies were carried out in the US and Europe and about 87% of the studies opted for the traditional mode of teaching & learning, whereas only 8% used blended mode and 4% online mode. The studies carried out examined various aspects such as measuring learner performance when UDL is applied in their teaching and learning process, developing lesson plans on the UDL guidelines, and measuring faculty perceptions of the UDL principles. From the literature review, it was identified that incorporating all three principles of UDL for the planning helps in students' perception and involvement of students. Therefore, it is necessary to understand the UDL principles and its guidelines that help to reduce learning barriers for students coming from diverse backgrounds in design education. But the study that was conducted by (Smith 2012) states that there is a need to construct a tool to assess UDL in college classrooms which will help to develop a better learning environment for students. So, the research focuses on developing and investigating the UDL standardized questionnaire/tool that would be helpful to design faculty in higher education during the course planning (curriculum, study materials, and assessment) which could meet the requirements of diverse learners without compromising with the quality of the design education.

Aim:

To investigate and develop a questionnaire/tool that would help in assuring the effectiveness of UDL in design education.

Objective:

- To determine the key attributes to assess the UDL in the design education.
- To estimate the major principles for assessing UDL in the design education.
- To develop a questionnaire that will evaluate the Universal Design performance for the learning and teaching process in design education.
- To develop and validate tools to assess the Universal design for learning across various design educational disciplines.

Research Questions:

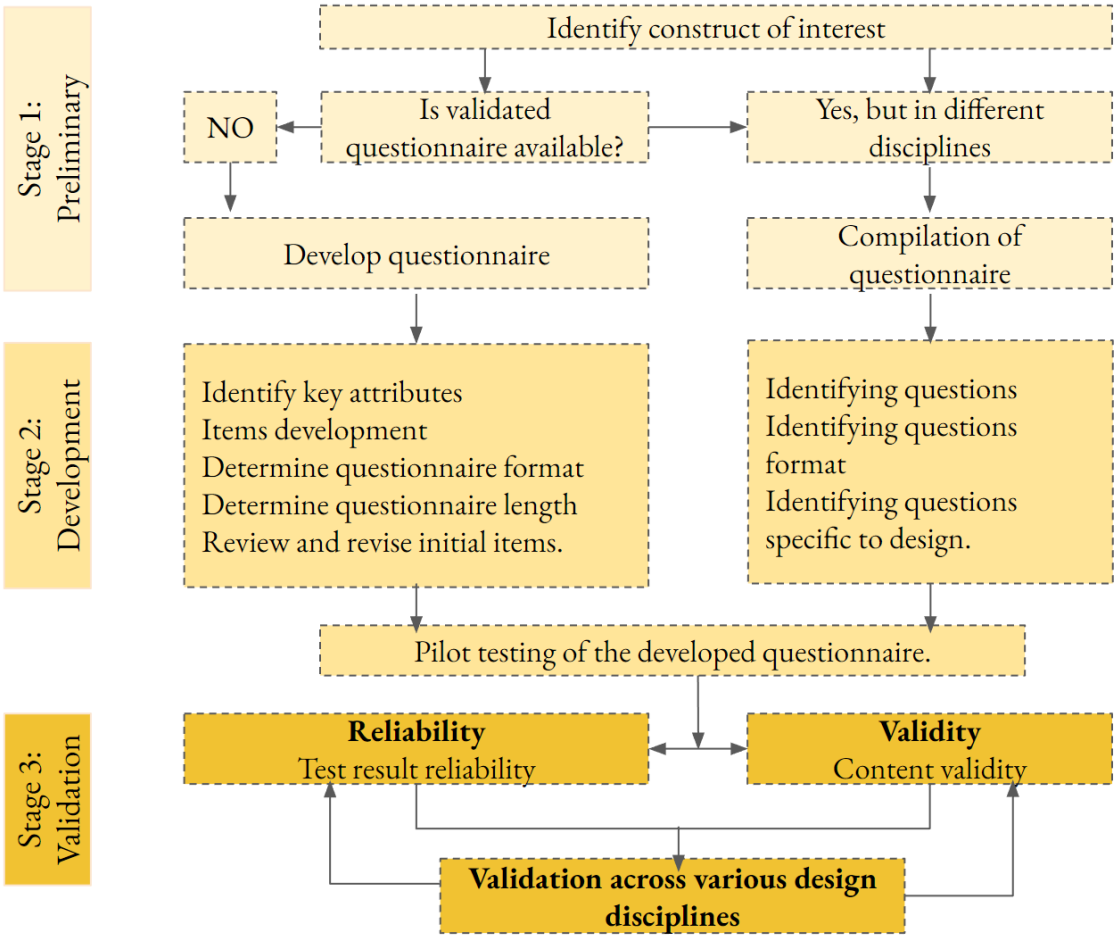
RQ1) What are the key attributes to assess the UDL for the design domain?
RQ2) What are the principles for assessing UDL in the design domain?
RQ3) What is the best standardized questionnaire/tool to assess the UDL for design domain?
RQ4) What is Sensitivity of the UDL among the different design domains?

Hypothesis:

H0 - An effective and efficient standardized questionnaire/tool might not be helpful in measuring the Universal design for learning in design education.
Ha - An effective and efficient standardized questionnaire/tool might be helpful in measuring the Universal design for learning in design education.

Research Methodology:

The study will be divided into three stages as shown in the below flow chart:



Expected Outcome:

- Key attributes to assess the UDL in the design domain
- Major principles for assessing UDL in design education
- Highly effective and efficient standardized questionnaire/tool to assess the UDL in design education
- Level of Sensitivity for UDL among the various domains in design education.

References:

- Almumen, Huda A. 2020. “Universal Design for Learning (UDL) Across Cultures: The Application of UDL in Kuwaiti Inclusive Classrooms.” *SAGE Open* 10(4):215824402096967. doi: 10.1177/2158244020969674.

- AlRawi, Jamelh Moshbab, and Mohammed Ali AlKahtani. 2021. “Universal Design for Learning for Educating Students with Intellectual Disabilities: A Systematic Review.” *International Journal of Developmental Disabilities* 1–9. doi: 10.1080/20473869.2021.1900505.

- Ayuso-del Puerto, Desirée, and Prudencia Gutiérrez-Esteban. 2022. “Achieving Universal Digital Literacy through Universal Design for Learning in Open Educational Resources.” *Education as Change* 26. doi: 10.25159/1947-9417/8712.

- Black, Robert D., Lois A. Weinberg, and Martin G. Brodwin. 2015. “Universal Design for Learning and Instruction: Perspectives of Students with Disabilities in Higher Education.” *Exceptionality Education International* 25(2). doi: 10.5206/eei.v25i2.7723.

- Capp, Matthew James. 2017. “The Effectiveness of Universal Design for Learning: A Meta-Analysis of Literature between 2013 and 2016.” *International Journal of Inclusive Education* 21(8):791–807. doi: 10.1080/13603116.2017.1325074.

- Carrington, Suzanne, Beth Saggers, Amanda Webster, Keely Harper-Hill, and Julie Nickerson. 2020. “What Universal Design for Learning Principles, Guidelines, and Checkpoints Are Evident in Educators’ Descriptions of Their Practice When Supporting Students on the Autism Spectrum?” *International Journal of Educational Research* 102:101583. doi: 10.1016/j.ijer.2020.101583.

- Chita-Tegmark, Meia, Jenna W. Gravel, B. Serpa Maria De Lourdes, Yvonne Domings, and David H. Rose. 2012. “Using the Universal Design for Learning Framework to Support Culturally Diverse Learners.” *Journal of Education* 192(1):17–22. doi: 10.1177/002205741219200104.

- Davies, Patricia L., Catherine L. Schelly, and Craig L. Spooner. 2013. “Measuring the Effectiveness of Universal Design for Learning Intervention in Postsecondary Education.” v26(n3):195–220.

- Flood, Margaret, and Joanne Banks. 2021. “Universal Design for Learning: Is It Gaining Momentum in Irish Education?” *Education Sciences* 11(7):341. doi: 10.3390/educsci11070341.

- Griful-Freixenet, Júlia, Katrien Struyven, Meggie Verstichele, and Caroline Andries. 2017. “Higher Education Students with Disabilities Speaking out: Perceived Barriers and Opportunities of the Universal Design for Learning Framework.” *Disability & Society* 32(10):1627–49. doi: 10.1080/09687599.2017.1365695.

- Izzo, Margaretha Vreeburg, Nisonger Center, Alexa Murray, and Jeanne Novak. 2008. "The Faculty Perspective on Universal Design for Learning." 21(2):13.

- Lakkala, Suvi, and Outi Kyrö-Ämmälä. 2021. "Teaching for Diversity with UDL: Analysing Teacher Competence." Pp. 241–77 in *Improving Inclusive Education through Universal Design for Learning*. Springer, Cham.

- McGhie-Richmond, Donna, and Andrew N. Sung. 2013. "Applying Universal Design for Learning to Instructional Lesson Planning." *International Journal of Whole Schooling* 9(1):43–59.

- Schelly, Catherine L., Patricia L. Davies, and Craig L. Spooner. 2011. "Student Perceptions of Faculty Implementation of Universal Design for Learning." *Journal of Postsecondary Education and Disability* 24(1):17–30.

- Smith, Frances G. 2012. "Analyzing a College Course That Adheres to the Universal Design for Learning (UDL) Framework." *F. G.* 12(3):31–61.

- Spooner, Fred, Joshua N. Baker, Amber A. Harris, Lynn Ahlgrim-Delzell, and Diane M. Browder. 2007. "Effects of Training in Universal Design for Learning on Lesson Plan Development." *Remedial and Special Education* 28(2):108–16. doi: 10.1177/07419325070280020101.

- Unluol Unal, Neslihan, Muhammed A. Karal, and Sema Tan. 2022. "Developing Accessible Lesson Plans with Universal Design for Learning (UDL)." *International Journal of Disability, Development and Education* 69(4):1442–56. doi: 10.1080/1034912X.2020.1812539.

- Wang, Yijing, Mélodine Sommier, and Ana Vasques. 2022. "Sustainability Education at Higher Education Institutions: Pedagogies and Students' Competences." *International Journal of Sustainability in Higher Education* 23(8):174–93. doi: 10.1108/IJSHE-11-2021-0465.

- Xie, Jingrong, and Mary F. Rice. 2021. "Professional and Social Investment in Universal Design for Learning in Higher Education: Insights from a Faculty Development Programme." *Journal of Further and Higher Education* 45(7):886–900. doi: 10.1080/0309877X.2020.1827372.

- Zhong, Ying. 2012. "Universal Design for Learning (UDL) in Library Instruction." *College & Undergraduate Libraries* 19(1):33–45. doi: 10.1080/10691316.2012.652549.

Signature: Mira R. Patel
Date: 30/12/2022
Name of Scholar: Mira Patel

Signature: M. Arunachalam
Date: 30/12/2022
Name of Guide: Dr. Arunachalam Muthiah